Yerington Mine Elevated Radiation Levels
And BLM Worker's Health and Safety Plan (HASP)
Questions and Answers

Q. I've been hearing a lot about radiation testing out at the Yerington mine. What's going on?
A. In June 2004, the BLM collected and sent for testing more than 100 shallow soil samples from the Yerington Mine site. BLM had the soil samples tested to determine the level of radiological hazards that workers might face during cleanup operations at the site.

Expedited results from nine samples indicate increased levels of radioactivity that could be a risk to workers on the site. BLM selected the nine samples for expedited testing based on field radiation detector readings from several different locations on the site, including the sulfide plant, the iron launder, evaporation ponds and the vat leach tank cover, as well as background materials.

The laboratory analyzed these samples for gross levels of radiation in uranium, thorium and radium radionucleides. The testing revealed levels of radiation in some areas high enough that health and safety protection and monitoring measures to protect site workers have been incorporated into a Worker's Health and Safety Plan (HASP). Final laboratory results for the remaining samples were similar to the results of the nine expedited samples.

Q. Why did BLM decide to test 100 soil samples for radiation? Why now?
A. In 2003, the BLM was conducting research into the history of activities at the mine site, and discovered the Anaconda Geological Documents Collection, archived at the American Heritage Center at the University of Wyoming. BLM subsequently initiated a review of these documents. Both the document review and recent soil and water testing revealed concentrations of uranium byproducts at several locations at the Yerington mine. Review of the historic information showed that in 1976, Anaconda assessed the feasibility of processing uranium found at the Yerington Mine site.

The review revealed that there were significant concentrations of uranium in the unlined evaporation ponds, and raised the possibility that it was still present. Other historic documents, referenced by the BLM in prior comments on ARCO work plans, show the presence of radionucleides in soils and in the groundwater aquifer at the mine site.

Q. What are the implications of these test results?
A. The elevated radiation levels indicated by these testing results will naturally be a source of concern for people who live near the Yerington mine. However, these 100 soil samples were tested for the specific purpose of preparing a Health and Safety Plan for BLM-contracted workers at the site. The test results for these 100 soil samples do not constitute a sufficient basis for addressing concerns that lie outside the scope of the plan. Further and more extensive testing in and around the Yerington mine will be necessary to address such issues.

Q. What measures are you taking to keep people away from areas with the highest radiation levels?
A. At this time, one acre of the 3,600- acre mine site has been taped off.

Q. What will be done to address concerns outside the mine site?

Further steps have been proposed to address wider concerns. These include:

Immediately mitigate obvious sources of fugitive dust.
Monitor fugitive dust in the air, both on- and off-site.
Fence around both the process area and other areas with elevated levels of radiation.
Post a guard at the site.
Conduct an aerial radiological survey on- and off-site.

Q. How else will the safety plan be used?
We will be working with ARCO and their on-site contractor to update their Health and Safety Plan to reflect the updated radiation levels indicated by the test results outlined in the BLM plan.

Q. Why is a safety plan so important?
A. The first step toward dealing with wider community concerns is to make sure it is safe for people to work at the site, where further testing, monitoring and cleanup operations will start. The workers who will eventually engage in cleanup operations at the site need to take appropriate precautions to prevent unacceptable exposure to radiation.

The Plan is designed to ensure BLM employees and contract workers can safely work at the Yerington Mine site. In addition to addressing such standard safety issues as how to work safely in a confined space, following the "Buddy system," and standard procedures for treating injured workers, this Plan also deals with preventing worker exposure to increased radiation levels.

A key element of the Plan is increased health and safety protection and monitoring for workers on the site because of the elevated levels of radioactivity. Worker radiation protection measures outlined in the HASP plan include wearing protective clothing to protect the skin, and respiratory protection to prevent inhaling radioactive particles in airborne dust.

Q. Where is the Yerington Mine?

The Yerington Mine is less than a mile from the city of Yerington and adjacent to the Walker River. The Yerington Paiute Tribal Reservation is about five miles north of the mine site. The approximate population of Yerington is 3,500 and less than 500 people live adjacent to the mine site. Some agricultural land exists next to the mine site, but the majority of the adjacent land is residential, with more homes being constructed immediately north and adjacent to the mine site.

Q. Some people in Yerington have to drink bottled water. What's wrong with their water?

Results of groundwater monitoring have also indicated levels of uranium in private wells that exceed the drinking water standard. Groundwater samples were collected in December 2003, as well as in March, April, May and June 2004. A large number of nearby residents have been provided with bottled water as a precautionary interim measure until an investigation work plan can be developed among the three Memorandum of Understanding agencies to understand the source and risk of elevated uranium levels in the residents' well water.

Q. Where is the groundwater plume?
A. The presence of a contaminated groundwater plume resulting from mining activities has been known for some time, but its extent remains unknown. The primary source of the plume is several evaporation ponds from which liquid mining waste has infiltrated into the groundwater table. Though the entire extent of the groundwater plume has not been fully characterized, the portion of the plume extending north and offsite is known to contain elevated concentrations of sulfate, total dissolved solids, iron, and chloride. Additional groundwater quality information is needed to determine the extent of offsite plume migration.

Q. Who are the partners in this venture?
A. In March 2002, the Bureau of Land Management signed a Memorandum of Understanding (MOU) with the Nevada State Division of Environmental Protection and the U.S. Environmental Protection Agency to coordinate investigations and remediation of the Yerington Mine by Atlantic Richfield. The three regulatory agencies agreed to work together to ensure a unified approach to site characterization.

Q. What is the history of the mine?
A. The Yerington Mine site is an historic copper mine site of mixed surface land ownership. Roughly 51 percent of the site is privately owned by Arimetco Inc., and 49 percent is public land managed by the BLM's Carson City Field Office. Arimetco filed for bankruptcy in 1997.

The Anaconda Copper Company operated the mine from 1953 to 1978 and disposed of mining wastes, including acid brines and tailings into evaporation ponds located on site. Liquid waste from Anaconda's operations over the years has infiltrated and impacted the groundwater quality.

ARCO purchased Anaconda in 1977, as the Yerington Mine was shutting down. In 1978, the mine was sold to a private entrepreneur who leased portions of the site to other companies for salvaging activities. In 1985, ARCO was ordered by the Nevada Division of Environmental Protection to address the impacts to the groundwater. As a result, it installed a series of extraction wells along the northern, down gradient boundary. However, continued migration of the groundwater plume prompted new concerns regarding leakage of the evaporation ponds and efficiency of the pump-back extraction system. In 1999, additional pumpback wells were installed by ARCO in an effort to contain the groundwater plume which had migrated off-site.

Arimetco purchased the property, including the unpatented mining claims in 1988. Arimetco had conducted a closed system copper extraction process of tailings from Anaconda's operation on leased land prior to the purchase. When Arimetco expanded its operations, it posted a reclamation bond. Arimetco filed for bankruptcy in 1997, but continued to operate the mine until January 2000, when it abandoned the site leaving four operational heap leach pads with approximately 92 million gallons of pregnant leach solution still in the system.

Q: How does the latest field radiological data from the Process Area at the Yerington Mine site compare to health and safety dose standards for workers and the public?

A:

1. Average annual dose to a person in the U.S. is about 360 millirem (ATSDR, 1999).
2. Average annual external dose to a person in the U.S. is about 100 millirem.
3. Average annual internal dose to a person in the U.S. is about 260 millirem.
4. A "rem" is a unit of dose that is used in the regulatory, administrative and engineering design aspects of radiation safety practice.
5. Occupational Health and Safety Administration (OSHA) standard for workers exposed to ionizing radiation is 5,000 millirem per year or 5 rem per year. DOE and NRC have the same standard.
6. US Navy supports OSHA worker standard of 5 rem per year, but sets an action level of one tenth (0.1) or 500 millirem per year in order to provide time for a radiation protection program to take steps to protect workers from further exposure.
7. Typical work year is about 250 days so to distribute the 5,000 millirem dose over a work year of 250 days: 5000 / 250 = 20 millirem per day for workers.
8. Typical work day is about 8 hours so to distribute the 20 millirem dose over an 8 hours day: 20 / 8 = 2.5 millirem per hour.
9. Some locations in the Process Area emit radioactivity at 0.2 to 0.6 millirem per hour.
10. If a worker were to spend an 8-hour day in the 0.2 millirem per hour location they would receive: 8 X 0.2 = 1.6 millirem in one 8-hour day.
11. If a worker were to spend an 8-hour day in the 0.6 millirem per hour location they would receive: 8 X 0.6 = 2.4 millirem in one 8-hour day.
12. Some areas of the Process Area read as high as 2 to 3 millirem per hour, as measured by hand-held dosimeter in utility line culvert.
13. If a worker were to spend an 8-hour day in the 2 millirem per hour location they would receive: 8 X 2 = 16 millirem in one 8-hour day.
14. If the US Navy 500 millirem action standard is used (2.0 millirem per day), then certain locations on the site would easily exceed this action level.
15. EPA standard for the public from cumulative exposure to radiation due to man-made sources is 15 millirem per year. This is the EPA standard for public health protection at the 12 km boundary for Yucca Mountain.
16. NRC standard for the public from cumulative exposure to radiation due to man-made sources is 25 millirem per year. This is the NRC standard for public health protection at the 12 km boundary for Yucca Mountain.

Q: How does the latest laboratory radiological data from the Process Area at the Yerington Mine site compare to EPA environmental standards?

A:

1. Laboratory analyses of the expedited soil samples from the Process Area indicate that some locations of surface soils emit significantly elevated levels of gross alpha and gross beta radiation.
2. The radioisotopes that have been analyzed in the soil samples are: Radium-226, Radium-228, total Uranium, and total Thorium.
3. Radium is measured as radioactivity per volume or pico Curies per gram (pCi/g).
4. Total Uranium and Thorium are measured as a mass or parts per million (ppm).
5. The Radium-226 (alpha emitter) in the 8 soil samples from the Process Area ranges from 3.3 pCi/g to 157 pCi/g. The average Radium-226 concentration in the 8 soil samples from the Process Area is 44 pCi/g.
6. The Radium-228 (beta emitter) in the 8 soil samples ranges from 1.8 pCi/g to 139 pCi/g. The average Radium-228 concentration in the 8 soil samples from the Process Area is 23 pCi/g.
7. The EPA standard for cleanup of land contaminated with residual radioactive material from an inactive Uranium processing site which is the concentration of Radium-226 in shallow surface soil (0 to 6 inches) is 5 pCi/g. If the concentration of Radium-226 is greater than 5 pCi/g, then EPA requires an action be taken to mitigate the residual soil down to the standard. Usually that means excavation, removal, and disposal of the soil at a NRC-licensed radioactive low-level waste commercial facility for final disposal (e.g., EnviroCare at Tooele, Utah). Workers require a radiological safety program in order to do this work.
8. There are no specific standards for total Uranium and Thorium in the soil measured in ppm, but the EPA health standard of 15 millirem per year still applies for protecting the public.
9. The primary concern that originates with the presence of Radium-226 is that it is the parent of Radon-222, a radioactive gas.